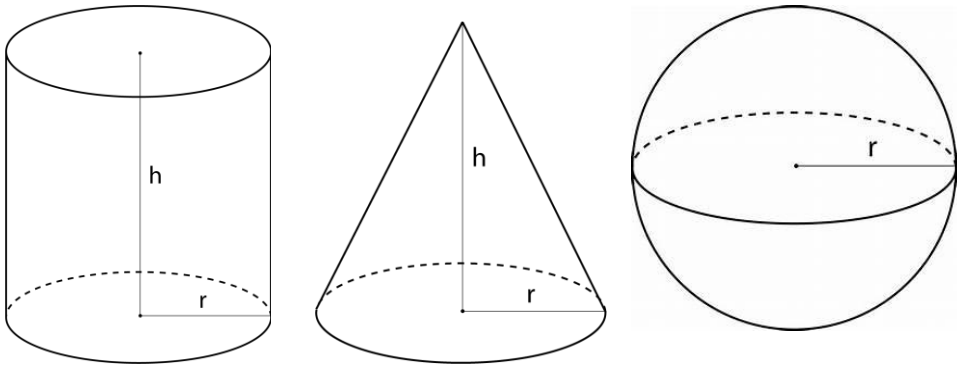
VOLUME



Unit 8

Standards:

8. G. 7 Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

8. G.C.9 : Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Name: _____ **Date:**_____ **Period:** _____

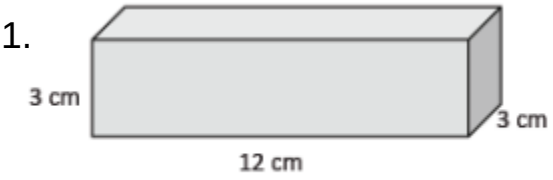
Lesson #81 Volume of Rectangular Prisms

To determine the volume of a rectangular prism, consider the area of the base and multiply it by the height.

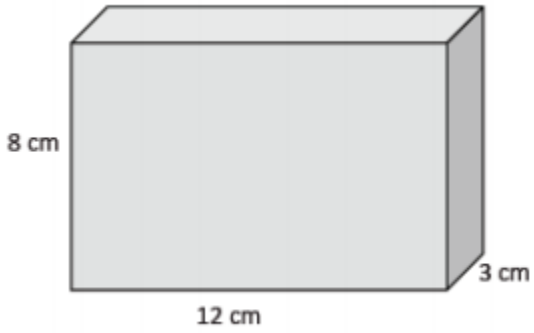
V = _____

Find the Volume of each:

1.



2.



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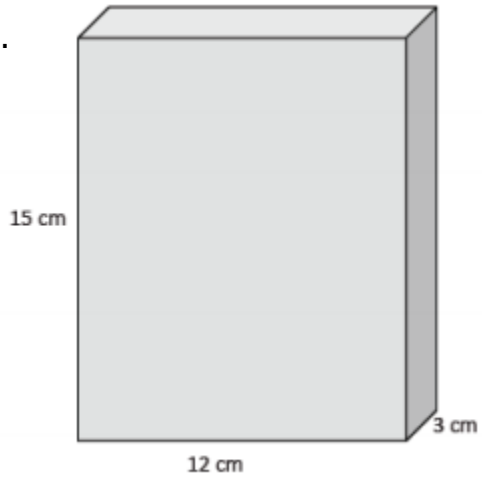

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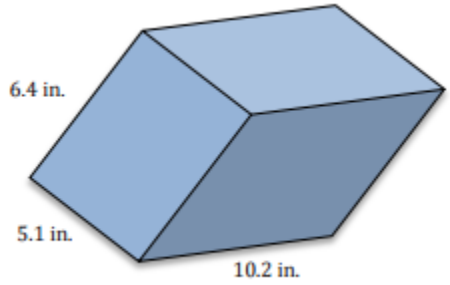
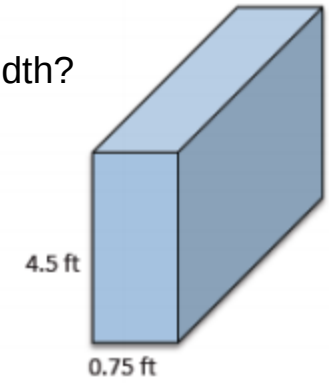


5. The volume of the prism below is 972 cm^3. What is its length?

6. The volume of the prism at right is 32.7375 ft^3. What is its width?



7. The length of a rectangular prism is 15 cm, its width is 20 cm and its volume is 1,350 cm^3. Find its height.

8. The height of a rectangular prism is 56 mm, its length is 30 mm and its volume is 40,320 mm^3. Find its width.

9. Jeremy and Lisa are comparing cereal boxes. The cover of Jeremy's cereal box is nine inches by eleven inches. The cover of Lisa's box is eight inches by twelve inches. If both boxes are three inches wide, whose box contains more cereal when full?

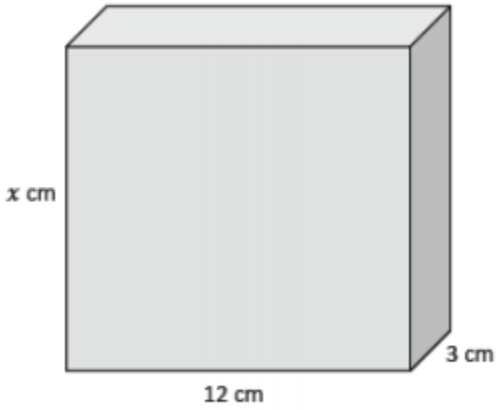
10. Kyle and Mikayla are comparing shoe boxes. Kyle's shoe box is 36 cm by 22 cm by 14 cm. Mikayla's shoe box is 32 cm by 18 cm by 10cm. How many times bigger is Kyle's box then Mikayla's?

HW #81 Volume of Rectangular Prisms

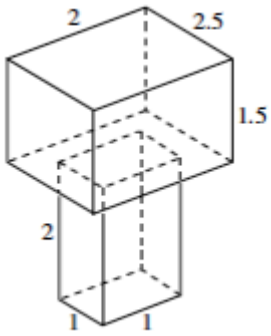
1. Mario is looking to purchase a sand box for his son. There are two available, one with a base that is 4 feet by 5 feet and 1 foot deep, and another with a base that is 3 feet by 6 feet and1.5 feet deep. If Mario is looking for the sand box that holds the most sand, which one should he choose?

2. Leah has two boxes. The dimensions of one box are 9 cm by 12 cm by 15 cm. The volume of the second box is twice the volume of the one described. List a set possible dimensions of the second box.

3. The volume of the prism below is 423 cm^3. Find the height of the prism.



4. Find the volume of the 3-dimensional figure below. Show work and or explain.



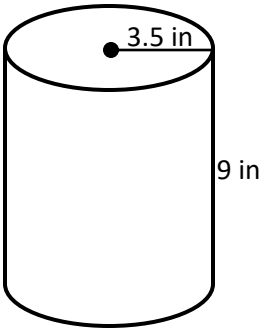
Lesson #82 Volume of Cylinders

To determine the volume formula of a cylinder, multiply the area of the base (which is a circle) with its height.

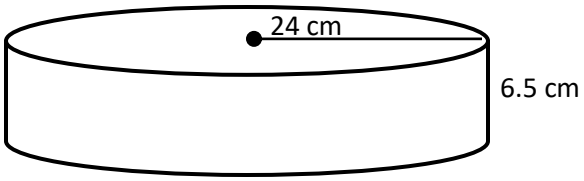
V = _____

Find the volume of each cylinder.

1.

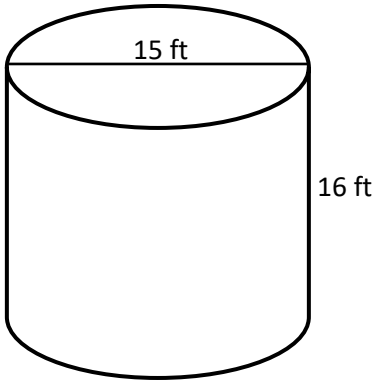


2.



3.

4.



5. Kevin has an Arizona Iced Tea can that is 10 inches tall, with a diameter of 3 inches. Colleen has a Sprite can that is 8 inches tall with the same diameter as the Iced Tea can. How much more liquid is in the Iced Tea can?

6. Cathy needs a box to send a cylindrical jewelry box to a friend for their birthday. The jewelry box is 18 cm tall with a diameter of 8 cm. Give possible dimensions of a box that the jewelry box will fit inside with a minimum amount of space left over. What volume of the box is not being taken up by the jewelry box?

Given the volume of each of the following cylinders in terms of pi, find the radius and diameter, given the height.

7. $V = 144\pi$

   h = 4 feet

   r = _____

   d = _____

8. $V = 320\pi$

   h = 5 meters

   r = _____

   d = _____

9. $V = 200\pi$

   h = 2 cm

   r = _____

   d = _____

10. $V = 4{,}320\pi$

    h = 30 mm

    r = _____

    d = _____

HW #82 Volume of Cylinders

1. A can of soda has a height of 4.75 inches and a radius of 1.25 inches. A box that is 5 inches by 8 inches by 5.5 inches contains a six pack of soda. Approximately, how much space is not used by the soda cans in the box?

Find the radius and diameter of each cylinder given it's volume in terms of pi and height.

2. $V = 162\pi$

   h = 2 feet

   r = _____

   d = _____

3. $V = 150\pi$

   h = 6 inches

   r = _____

   d = _____

4. $V = 128\pi$

   h = 8 cm

   r = _____

   d = _____

5. $V = 735\ \pi$

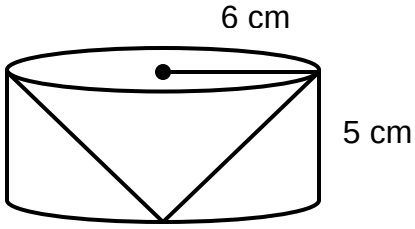
   h = 15 mm

   r= _____

   d = _____

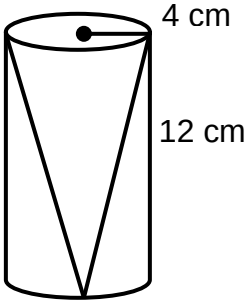
Lesson #83 Volume of Cones

Use the diagrams below to determine the relationship of the volume of a cylinder and a cone with the same size base.



Cylinder Volume: 180π cm^3

Cone Volume: 60π cm^3

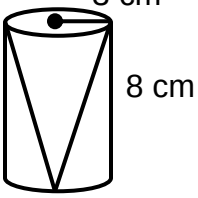


Cylinder Volume: 192π cm^3

Cone Volume: 64π cm^3

Find the volume of each cylinder, then find the volume of each cone.

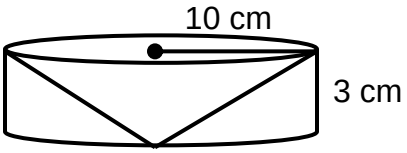
1.



Cylinder Volume: _____

Cone Volume: _____

2.

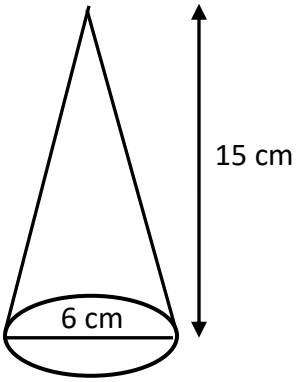


Cylinder Volume: _____

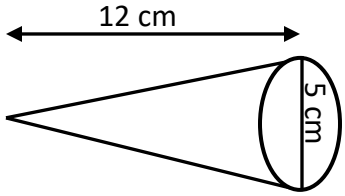
Cone Volume: _____

Find the volume of each cone.

3.



4.



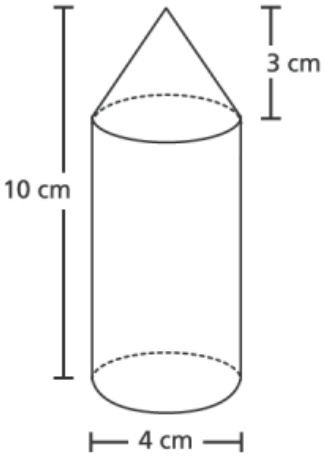
5. What is the volume formula for a cone?

6. Tiana would like to buy ice cream cones for her birthday party, but since she does not have very much ice cream, she wants cones with the smallest volume. Which of the following brands of ice cream cones should she buy?

BRAND A
height of cone: 15cm
radius of cone base: 4cm

BRAND B
height of cone: 12cm
diameter of cone base: 10cm

7. Find the total volume of the shape below.



Find the radius and diameter of each cone described below:

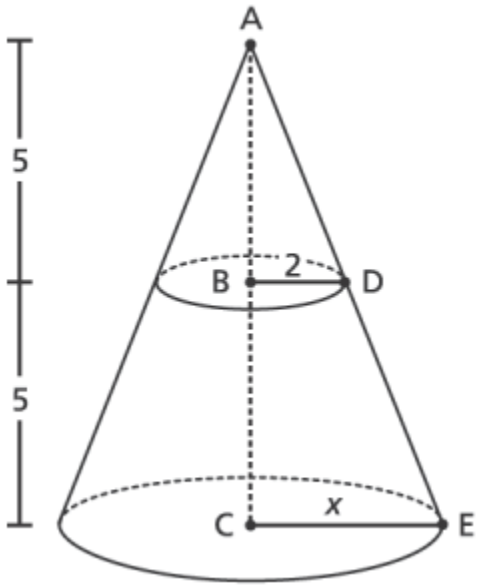
8. $V = 75\pi$
   h = 9 cm
   r = _____
   d = _____

9. $V = 484\pi$
   h = 12 in
   r = _____
   d = _____

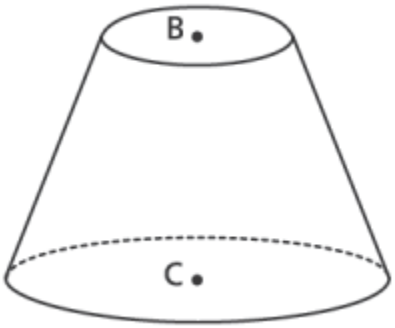
10. $V = 288\pi$
    h = 6 ft
    r = _____
    d = _____

HW #83 Volume of Cones

1. Find the volume of the entire cone shown below.



2. If the top of the cone, shown with height A to B is removed, what is the volume of the bottom piece, shown with height B to C.



Find the radius and diameter of each cone described below:

3. $V = 294\pi$

   h = 18 cm

   r = _____

   d = _____

4. $V = 108\pi$

   h = 4 in

   r = _____

   d = _____

5. $V = 128\pi$

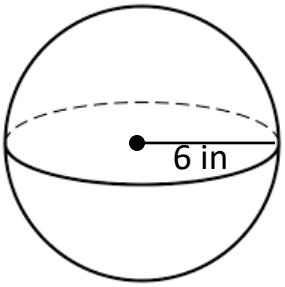
   h = 24 ft

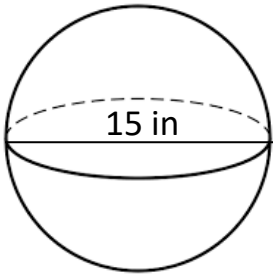
   r = _____

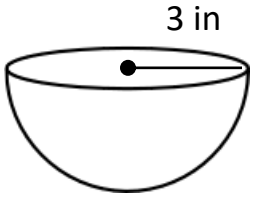
   d = _____

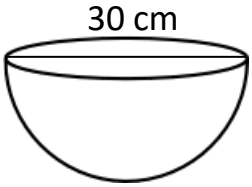
Lesson #84 Volume of Spheres

The formula for volume of a sphere is $V = \frac{4}{3}\pi r^3$. Calculate the volume of each of the following, in terms of pi and to the nearest tenth of a cubic unit.

1. 

2. 

3. 

4. 

5. A basketball with a radius of 4.25 inches.

9. A punch bowl with a diameter of 30 centimeters.

Given the volume of each sphere described below find its radius and diameter.

6. $V = 288\pi$

   r = _____

   d = _____

7. $V = 36\pi$

   r = _____

   d = _____

8. $V = 2304\pi$

   r = _____

   d = _____

9. Michael has caught many baseballs at games he has attended and stores them in a box that is 40 cm by 40 cm by 25. A baseball has a radius of 3.75 cm. How many baseballs can fit in the box?

10. Caitlyn has an ice cream cone with a height of 20 cm and a radius of 4 cm filled completely with ice cream. She scoops a perfect sphere with a radius of 4 cm and puts it on top. What is the total volume of the ice cream?

HW #84 Volume of Spheres

1. A sphere with a radius of 3.2 inches

2. A sphere with a diameter of 5 feet.

Given the volume of each sphere described below find its radius and diameter.

3. $V = 972\pi$

   r = _____

   d = _____

4. $V = 4500\pi$

   r = _____

   d = _____

5. Maggie has a collection of marbles that she stores in a box that is 30 cm by 30 cm by 15 cm. Each marble has a radius of 1.5 cm. How many marbles can fit in the box?

State Test Review: Multiple Choice

1. What value of t that satisfies the equation below?

   $3(t + 4) – 2(2t + 3) = - 4$

   A $-\frac{11}{3}$ **B** $-\frac{4}{5}$

   C 10 **D** 11

2. What is the value of j that satisfies the equation below?

   $\frac{1}{2}(6j + 18) – 4(3j + 4) = -10$

   A -3 **B** $-\frac{1}{3}$

   C $\frac{1}{3}$ **D** 3

3. A crane is lowering a concrete block from a height of 270 feet about the ground at a constant rate of 2.5 feet per second. Which function can be used to determine h, the height, in feet, above the ground of the concrete block after s seconds?

   A h = 270s + 2.5 **B** h = 2.5s + 270

   C h = 270 – 2.5s **D** h = 2.5s – 270

4. The cost to rent a paddle boat at the city park includes an initial fee of $7 plus $3.50 per hour. Which equation models the number of hours, x, that the paddleboat is rented?

   A y = 3.5x + 7 **B** y = 7x + 3.5

   C $y = \frac{x}{7} + 3.5$ **D** $y = \frac{x}{3.5} + 7$

5. What is the equation of the line that passes through points (-3, 0.5) and (3, -0.5)?

   A $y = -\frac{1}{6}x$ **B** y = -6x

   C $y = -\frac{1}{6}x + 1$ **D** y = -6x – 17.5

6. A lines contains the points (4, 2) and (0, -1). What is the equation of the line?

   A y = 2x – 6 **B** $y = \frac{3}{4}x – 1$

   C $y = \frac{1}{4}x + 1$ **D** $y = \frac{4}{3}x – \frac{10}{3}$

7. Which equation represents a nonlinear function?

   A y = -3x + 1 **B** $y = x^2 + 1$

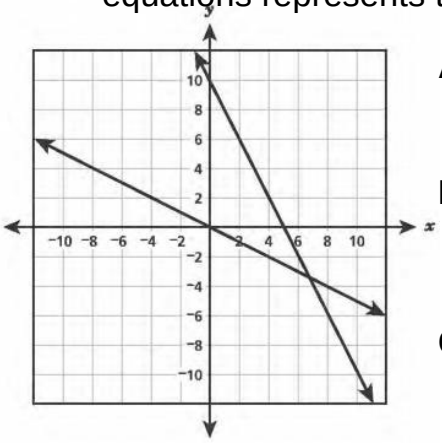
   C $y = \frac{x}{2} + 1$ **D** $y = 2x + \frac{1}{2}$

8. Which equation does not represent a linear function?

   A y = 2(x – 3) **B** $y = 2^2 – 3x$

   C $y = \frac{x+1}{5}$ **D** $y = 2x^2 + 3x$

9. The graph of a system of equations is shown below. Which system of equations represents this graph?



A $y = -2x + 10$
$y = -\frac{1}{3}x$

B $y = -2x + 10$
$y = -\frac{1}{2}x$

C $y = -\frac{1}{2}x + 10$
$y = -2x$

D $y = -\frac{1}{3}x + 10$
$y = -2x$

10. Solve the system of equations below.

$2x + 4y = 10$
$2x + 4y = -10$

A x = 3, y =1

B x = 6, y = -4

C No solution

D Infinite solutions

11. Mr. Thomsen is buying two types of gift cards to give as prizes to employees at a company meeting. He will buy restaurant gift cards for $50 each. He will also buy movie theater gift cards for $20 each. he has $450 to buy a total of 15 gift cards. How many of each card can Mr. Thomsen buy?

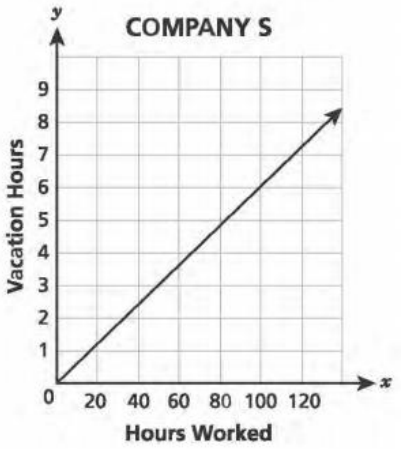
A 5 restaurant and 10 movie cards

B 8 restaurant and 7 movie cards

C 10 restaurant and 5 movie cards

D 12 restaurant and 3 movie cards

12. Two friends work at different companies. Both companies use the number of hours that an employee works to calculate their vacation hours, shown in the table and graph below.



Which statement represents the difference in each friend's vacation hours if both work 2,080 hours?

A The friend at company s will have about 42 more vacation hours than the friend at company p.

B The friend at company s will have about 46 more vacation hours than the friend at company p.

C The friend at company p will have about 8 more vacation hours than the friend at company s.

D The friend at company p will have about 9 more vacation hours than the friend at company s.

13. The Ecology club was planning to take a field trip either to the seacoast or the mountains. The club president surveyed all members to determine the preferred trip. The results are shown in the table below. Which statement is true about the results of the survey?

A 20% of 8th graders chose seacoast.

B 32% of 7th graders chose mountains.

C 40% of all students chose mountains.

D 48% of all students chose seacoast.

FIELD TRIP SURVEY

Students	Seacoast	Mountains	Total
Seventh-Grade	42	28	70
Eighth-Grade	30	50	80
Total	72	78	150

14. The winning time for the men's 400 meter race in each of the Olympic games from 1976 to 1996 can be modeled by the equation y = -0.054x + 44.54, where x is the number of years after 1976 and y is the winning time in seconds. If the relationship continues, which equation could be used to predict the winning time in the year 2020?

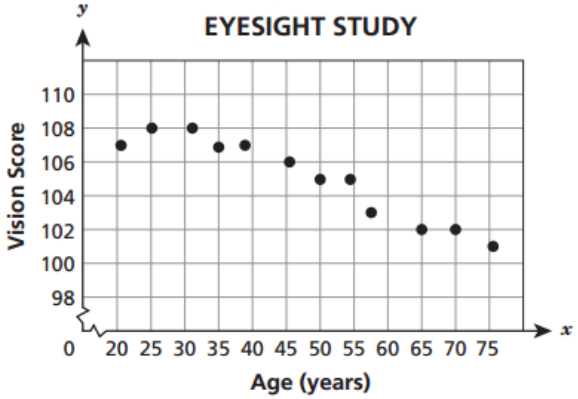
A y = -0.054(1976) + 44.54

B y = -0.054(2020) + 44.54

C y = -0.054(24) + 44.54

D y = -0.054(44) + 44.54

15. A researcher studied the eyesight of people at different ages. She calculated a vision score for each person in the study and plotted the data on the graph below.



The researcher used the line y = -0.1x + 110 to model the data. When she substituted the value x = 65 into this equation, what did the result tell her?

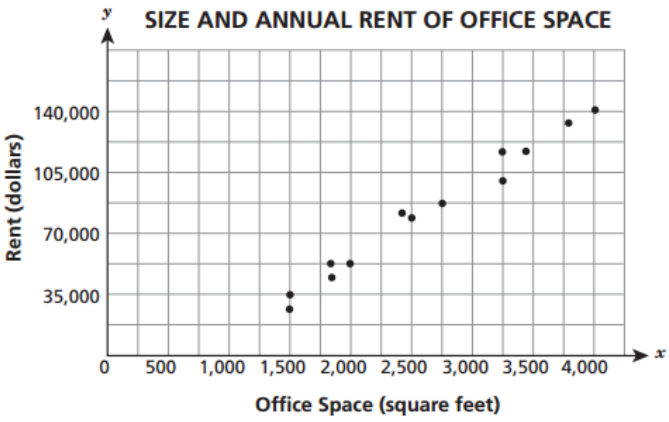
A the exact value for the vision score of a 65 year old

B the predicted value for the vision score of a 65 year old

C the minimum possible value of the vision score of a 65 year old

D the maximum possible value of the vision score of a 65 year old

16. The scatter plot shows the sizes and annual rents of some office spaces in the downtown area of a city. What would the line of best fit reveal about these data?



A There is a strong negative relationship between cost of rent and the office space.

B There is a strong positive relationship between cost of rent and the office space.

C There is a weak positive relationship between cost of rent and the office space.

D There is a weak negative relationship between cost of rent and the office space.

17. Mr. Wallace surveyed 75 students at Poole Middle school to find out the students' favorite place to each lunch. The results are show in the table below. Which table shows the approximate relative frequencies of Mr. Wallace's data?

FAVORITE PLACE TO EAT LUNCH

	Cafeteria	Outside	Total
Boys	16	21	37
Girls	24	14	38
Total	40	35	75

A

FAVORITE PLACE TO EAT LUNCH

	Cafeteria	Outside	Total
Boys	16%	21%	37%
Girls	24%	14%	38%
Total	40%	35%	75%

B

FAVORITE PLACE TO EAT LUNCH

	Cafeteria	Outside	Total
Boys	21%	28%	49%
Girls	32%	19%	51%
Total	53%	47%	100%

C

FAVORITE PLACE TO EAT LUNCH

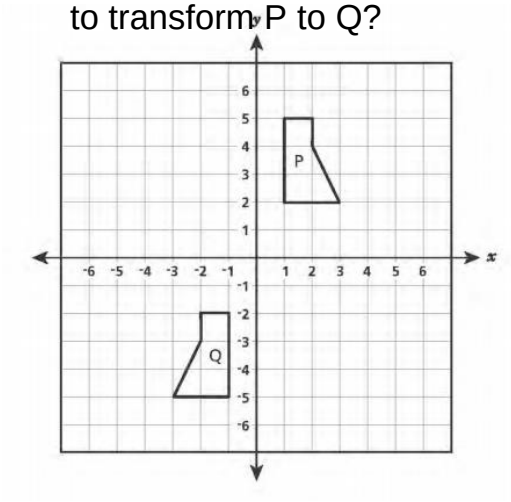
	Cafeteria	Outside	Total
Boys	40%	60%	49%
Girls	60%	40%	51%
Total	100%	100%	100%

D

FAVORITE PLACE TO EAT LUNCH

	Cafeteria	Outside	Total
Boys	43%	57%	100%
Girls	63%	37%	100%
Total	53%	47%	100%

18. Pentagon P and pentagon Q, shown below are congruent. What sequence could be used to transform P to Q?



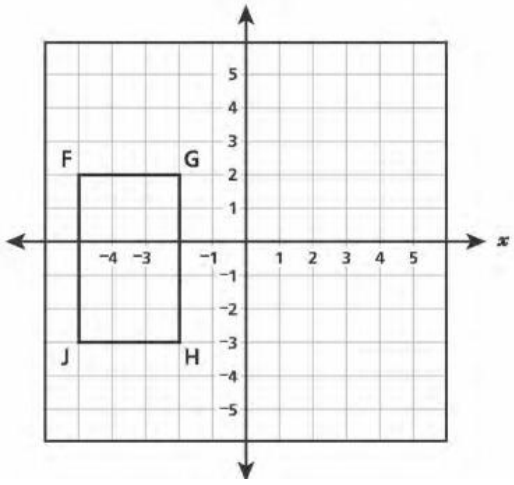
A A 180° clockwise rotation about the origin.

B A translation four units left and then a reflection over the x-axis.

C A reflection over the y-axis and then a translation seven units down.

D A translation seven units down and then a 90° clockwise rotation about the origin.

19. Rectangle FGHJ, shown below, is translated 6 units right and 1 unit up to produce rectangle F'G'H'J'. Which statement about the side lengths of rectangle F'G'H'J' is true?



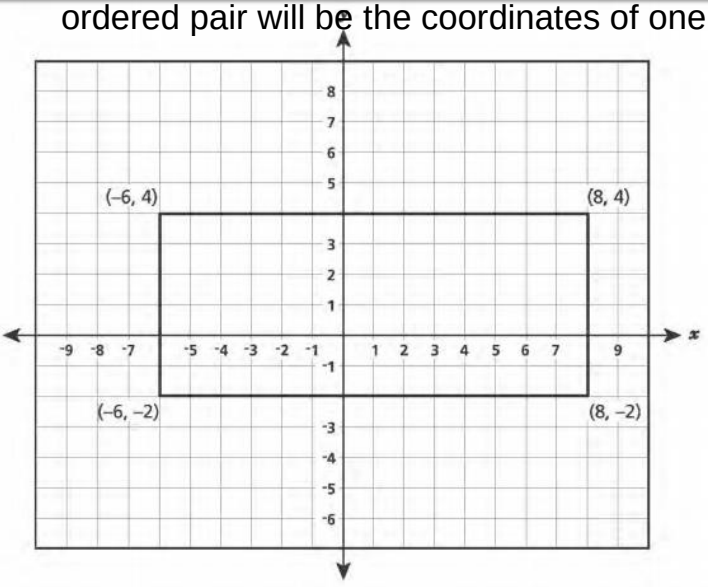
A F'G' = 3 and G'H' = 5

B F'G' = 3 and G'H' = 6

C F'G' = 9 and G'H' = 5

D F'G' = 9 and G'H' = 6

20. Mia enlarged a plan for an outdoor stage. The original plan is shown below. She dilated the outdoor stage by a scale factor of four with the center of dilation at the origin. Which ordered pair will be the coordinates of one of the new vertices?



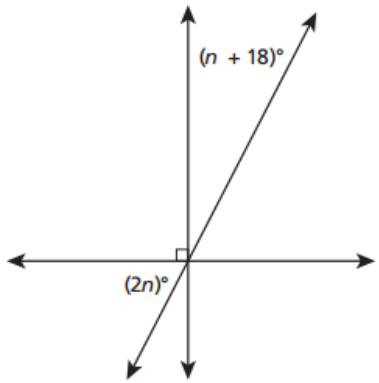
A (2, 1)

B (8, 16)

C (32, 4)

D (32, 16)

21. What is the value of n in the diagram below?



[not drawn to scale]

A 18

B 24

C 42

D 48

22. Triangle A is similar to triangle B. Triangle A has two angles with measure of 28° and 84°. Which two angle measures could be included in triangle N?

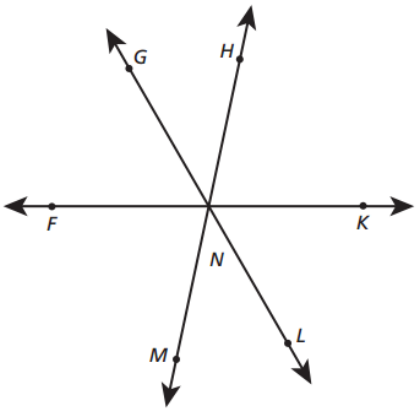
A 28° and 112°

B 28° and 96°

C 84° and 96°

D 84° and 68°

23. In the diagram below, three lines intersect at N. The measure of ∠GNF is 60°, and the measure of ∠ MNL is 47°. What is the measure of ∠HNK?



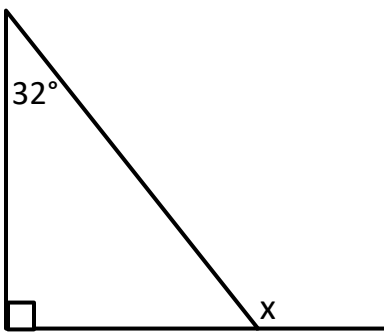
A 47°

B 60°

C 73°

D 107°

24. What is the measure of the exterior angle shown in the diagram below?



A 58°

B 68°

C 122°

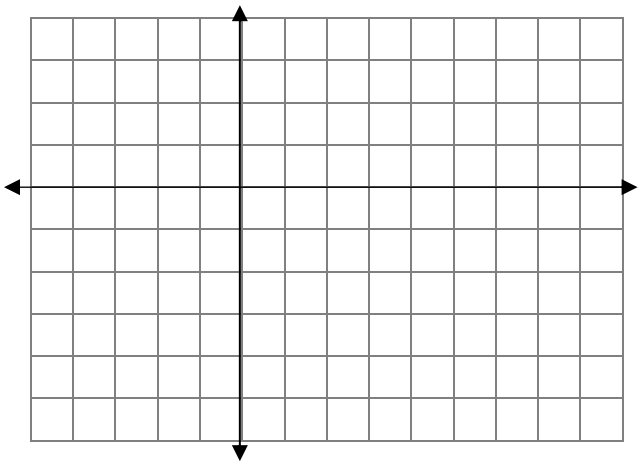
D 148°

State Test Review – Short Response

1. Determine the number of solutions that exist to the equation below.

   $8(x - 4) = 2(4x - 16)$

2. A certain function is defined as "multiply the input by $-\frac{3}{4}$, then add 2. Graph the function on the coordinate plane below.



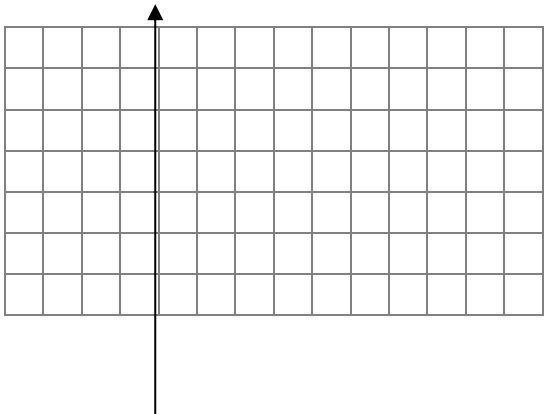
3. Write an equation for a function that is not linear. Why is it not linear?

4. Tim is selling tickets to a school sporting event to raise money for his club. He put some extra money in his box before he began. As he sells tickets, he records the number of tickets he has sold and the total amount of money in the box. Some of his data are shown below. Assuming all the tickets are the same price, write an equation that represents the situation in the table. How much money was originally in the box?

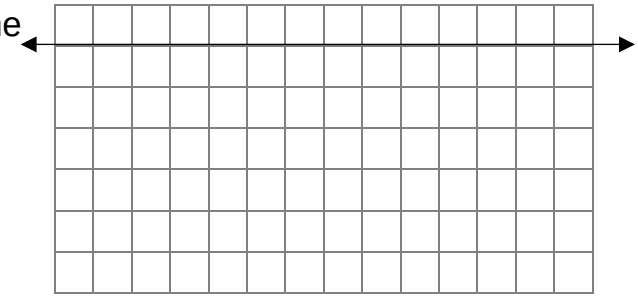
Tickets Sold	Money in Box
7	108.75
13	146.25
18	177.50

5. Oliver works at a bookstore. He packed 20 identical paperbacks and 9 identical textbooks in a box. The total mass of the books was 44.4 pounds. After he put 1 more textbook and 5 more paperbacks in the box, the total mass of the books was 51 pounds. Determine the mass of one textbook and one paperback book.

6. Jenny wants to rent a truck for one day, She contacted two companies. Laguna's Truck Rentals charges $20 plus $2 per miles. Salvatori's Truck Rentals charges $3 per mile. After how many miles will the total cost for both companies be the same?



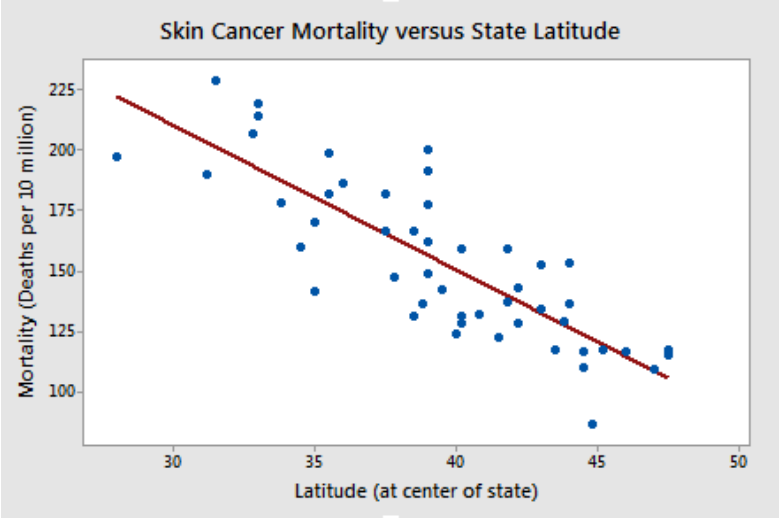
7. Graph and label the given system of equations on the coordinate plane below. What is the solution?



$y = \frac{1}{2}x + 2$

$y = x - 1$

8. Use the scatter plot below to answer the questions in complete sentences.

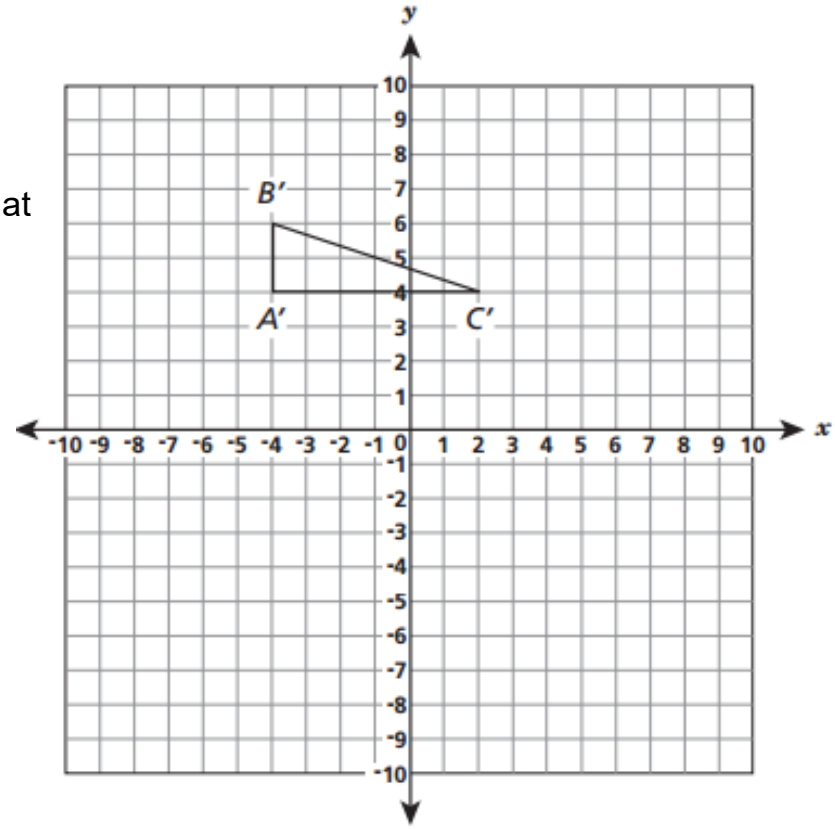


What type of association/correlation exists between skin cancer mortality and latitude?

The equation, y = 230 – 3x, represents the line of best fit for the scatter plot. What does the y – intercept represent and slope represent?

Use the line of best fit to predict the mortality rate of a state with a center latitude of 48.

9. Triangle ABC, at right, went through a series of transformations to get A”B”C”. B” is located at (-2, -2) and C” is located at (1, -1). Determine the location of A” and state the two transformations that were completed.



10. Rectangle MATH is congruent to Rectangle M’A’T’H’. Find x and y.